



# THE EFFECT OF CO-LOCATIONS ON STUDENT ACHIEVEMENT IN NYC PUBLIC SCHOOLS

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## ABOUT THE AUTHOR

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Winters received his B.A. in political science from Ohio University in 2002, a Ph.D. in economics from the University of Arkansas in 2008.

# THE EFFECT OF CO-LOCATIONS ON STUDENT ACHIEVEMENT IN NYC PUBLIC SCHOOLS

Marcus A. Winters INTRODUCTION

The advent and spread of charter schools—publicly funded schools that operate independent of the surrounding school district—have raised important questions, including why the performance of charter schools themselves varies. But in public debate, the most prominent policy question related to charters hinges less on their effectiveness and more on their effect on so-called traditional public schools. Traditional public schools, significantly, remain those that a large majority of a school district's students will continue to attend—thus the impact of charters on these schools is of obvious importance.

Competing schools of thought have emerged in response to this question. Those who are optimistic about charters as a leading edge of systemic reform argue that the methods and structure of charters that prove successful will, in turn, influence practice in non-charter schools—to the benefit of school systems at large. Such effects may be magnified because traditional public schools will have to compete with charter schools for students—and the financial support that comes with them. Opponents of charters, in contrast, focus pessimistically on the possibility that the more able students—and their good example—will be diverted to charters, along with physical and financial resources.

These two schools of thought have led, not surprisingly, to an emerging body of empirical research. Such work has broadly demonstrated that neither side of this debate is entirely correct. A fair reading of the empirical research is that the introduction of charter schools—and the resulting competition for students through school choice programs—has either a small, positive effect or no discernible effect (though not a

negative one) on student achievement in local traditional public schools.<sup>1</sup>

This paper adds to the charter school-related research by examining another dimension of the relationship between charters and traditional public schools. It seeks to determine whether charter schools could influence public schools, for better or worse, in a particular situation common in some cities: where charter schools share buildings, or are “colocated,” with traditional public schools. (In colocations each school is assigned a segment of classrooms and hallways, while major amenities such as gyms, cafeterias, and libraries are shared.) Charter school colocations are found in urban school districts across the nation: Chicago, Denver, Boston, Milwaukee, and several large districts in California use the practice.

Colocation is perhaps most widespread and controversial in New York City, where the high price of real estate makes such colocations common. Indeed, colocations of public schools generally—not just those involving charter schools—are a distinctive feature of the New York City schools. During the Bloomberg administration from 2002 to 2012, the number of public schools increased from fewer than 1,200 to more than 1,800. This increase was due to the rapid growth of the city’s charter sector—which increased from 17 schools in 2002 to 183 in 2013—and a general strategy of dividing large schools into smaller, theme-based academies. Today, 1,150 (63 percent) of the city’s 1,818 public schools are colocated. Of these 1,150 colocated schools, 115 are charter schools. More than two-dozen approved charter colocations have been approved for the 2014-15 school year but are now being reviewed by the de Blasio administration and are the subject of a lawsuit brought by the teachers union.<sup>2</sup>

As in the broader debate, competition theories have been advanced as to the effects of such situations. Those who are concerned about the spread of charters fear that they might prove intrusive and compete for scarce physical and temporal resources; others hope that charters might serve as positive examples for their public school neigh-

bors. Though colocation among traditional public schools is common and often goes without comment, new charter school colocations in New York City often cause controversy.

That colocations lead to operating changes in the traditional public schools that are already operating in a facility seems clear. But such changes should only be worrisome from a policy perspective if they lead to lower student performance in the traditional public schools that are required to share facilities.

Do colocations affect student achievement in traditional public schools already operating in a facility? Do colocations with charter schools have a particular effect on public school effectiveness? These important questions have yet to be addressed in any empirical research of which I am aware.

In this paper, I use data following the test-score performance of individual New York City students over a period of five years to assess whether colocations affect student achievement in traditional public schools. Essentially, the empirical model compares academic growth in a traditional public school before and after the introduction of a colocation, or as the magnitude of the colocation changes, holding constant everything about the school that does not change over time.

I find no evidence that colocations—whether with charter schools or with traditional public schools—in New York City have any discernible impact (positive or negative) on student achievement in a traditional public school. This result is consistent across various measures for the existence and magnitude of colocation.

It is certainly possible that colocation arrangements produce discomfort for all parties. (There are often difficulties scheduling the use of common spaces such as cafeterias, auditoriums, gyms, etc.) However, any inconveniences due to colocations do not appear to manifest in lower student learning in receiving traditional public schools. Thus, the evidence suggests that policymakers considering colocations need not weigh the potential benefits for students

who would attend a charter school against reductions in the performance of students attending a traditional public school that is required to share facilities with the charter.

## DATA

I utilize data provided by the New York City Department of Education that follow individual students over time. The data set includes test scores and demographic information for the universe of students in New York City who were administered the state's math and ELA exams in grades three through eight from 2006–07 through 2010–11. Thus, my analysis focuses on public elementary and middle schools. To aid interpretation, I standardize test scores by grade and year to have a mean of zero and a standard deviation of one.

Because we are exclusively interested in the effect of colocations on student performance in traditional public schools, I exclude students attending charter schools from the final data set for estimation. Charter schools are included when determining the existence and magnitude of colocation in a facility.

I acquired information on colocations from the Enrollment-Capacity-Utilization reports (commonly known as the “blue books”) published each year by the NYC Department of Education. These reports use a unique building identifier to match schools to their facilities. The reports also include the school's total enrollment in that building as well as the building's maximum capacity.

The data set matches students to their schools using a unique identifier for the school. This unique school identifier is also used to match schools to their buildings. However, a problem exists in our context because many schools in New York City operate in multiple facilities. In such cases, the data set does not allow me to directly identify the facility in which the student attended school.

I address the issue of matching students to buildings by developing the sample for estimation in two ways. The first strategy matches each student en-

rolled in a school to the facility in which the school enrolls the most students. In what follows, I refer to this location as the school's “main campus.” The second strategy restricts the analysis to include only traditional public schools that are located in a single facility. The results from estimation are nearly identical, regardless of the estimation sample used.

## DESCRIPTIVE EVIDENCE

We first consider descriptive evidence to evaluate whether the general pattern of public school performance is consistent with the theory that new colocations—particularly, new charter school colocations—are harmful to student achievement in the traditional public schools that are already operating in a given facility. The results of such analysis should not be considered causal; rather, they help set the stage and develop expectations for later empirical analysis.

The analysis compares the average test-score gains made by students in a school in the year prior to and the year immediately following a colocation. If colocations were harmful to the productivity of a receiving public school, we would suspect that student test-score growth, on average, would likely be statistically larger in the year prior to sharing facilities than in the first year in which the school shared space. Alternatively, when a colocation arrangement ends, we would suspect that average test-score growth in a public school would be greater in the year following the removal of a colocation arrangement than in the prior year, when the school shared space in its facility.

The reported analyses include only traditional public schools that operate in a single facility. Results are similar when we match students to their school's main campus. For simplicity, I report only analyses that combine years, in order to increase the number of observations available. Results are similar when individual analyses are conducted for each year.

Table 1 compares the average test-score gains of students in traditional public schools in the year prior to and the year immediately following a new colo-

Table I: School Test Score Increases In Years Prior to and Post Co-Location				
All Colocations				
	New Colocation 2008 Through 2011		Removed Colocation 2008 Through 2011	
	Year Prior	Year Post	Year Prior	Year Post
Math	0.04	0.02	0.03	0.01
P-Value		0.33		0.30
ELA	0.04	0.02	0.04	0.02
P-Value		0.46		0.34
Number of Schools	62		68	
Charter Colocations				
	New Charter School Colocation 2008 Through 2011		Removed Charter School Colocation 2008 Through 2011	
Math	0.03	0.00	-0.04	-0.06
P-Value		0.30		0.68
ELA	0.04	0.03	0.04	0.03
P-Value		0.53		0.72
Number of Schools	43		12	

Note: \* Significant at 10% level  
\*\* Significant at 5% level

cation. Because test scores have been standardized, the results can be interpreted in standard deviation units. We would suspect that, on average, schools would make a gain of zero points.

The table looks at changes in average school gains after the first introduction of colocation and also after a colocation arrangement is removed. Separate analyses are run, evaluating the effect of colocations of any kind and charter school colocations in particular. In each case, the results of this descriptive analysis provide little reason to suspect that colocations lead to meaningful differences in student achievement in a traditional public school. In no case do we see a statistically significant relationship between the gains prior to and after a colocation arrangement began or ended.

The descriptive exercise indicates no statistically discernible difference in average student test-score gains in traditional public schools in years with and without colocations. While suggestive, further analysis is necessary to more accurately measure dif-

ferences in public school productivity as it relates to colocations, accounting for other student and school factors. We carry out such an analysis in the following section.

## EMPIRICAL METHOD

The empirical method takes advantage of the data set's capability of following students as they progress through schools over time. The model estimates the impact of colocation on student math or ELA scores in a traditional public school while controlling for the student's observed demographic characteristics, prior year's test score, the academic school year, and a fixed school component. Formally, I estimate a model taking the form:

$$(1) \quad Y_{ist} = \beta_0 + \beta_1 Y_{ist-1} + \beta_2 X_{ist} + \beta_3 \delta_{ist} + \lambda + \varepsilon_{ist}$$

Where  $Y_{ist}$  is the test score of student  $i$ , in school  $s$ , during year  $t$ ;  $X$  is a series of observed characteristics about the student, including test score in the prior year;  $\delta$  is one of several potential measures of

sharing facilities;  $\lambda$  is a school fixed effect;  $\varepsilon$  is a stochastic term; and  $\beta$  is a parameter to be estimated. Standard errors are calculated to account for clustering within schools.

Use of a school fixed effect in (1) forces the model to compare the achievement of students in a traditional public school as the measure of sharing facilities changes for that school over time. This approach statistically accounts for all features of a school that do not change over time. Essentially, the model estimates the impact of colocations within the public school over time rather than across public schools. This procedure helps account for unobserved differences in the type of school that is subjected to colocation.

To ensure the robustness of the findings, the analysis incorporates several measures of sharing facilities ( $\delta$ ). I estimate models that account for colocations with: an indicator for whether the school shares space with another school; an indicator for whether the school shares space with a charter school; the number of schools sharing the facility with the traditional public school; and the percentage of students in the building who attend the traditional public school.

The sample used to estimate (1) includes all students enrolled in grades four through eight between 2006–07 and 2010–11.<sup>3</sup> As previously described,

I use two strategies: one that restricts the data set to include all schools and that matches students to their school's main campus; and one that restricts the sample to include only students in schools that operate in a single facility.

## RESULTS

The results from estimating various forms of (1) are reported in Table 2. Each cell in the table reports the results of an independent regression. Thus, the table reports the results of 16 regressions in total.

Models utilizing each definition of colocation find no statistically significant relationship between colocation and student academic achievement in a traditional public school. There is no significant impact of colocating with any school, no particular impact of colocating with charter schools,<sup>4</sup> and no impact of increasing the number of schools operating in the facility.

The lone significant result occurs for the percent capacity measure of colocation in math. In this case, we find that a one-percentage-point increase in the school's footprint in the facility leads to a reduction of about 0.07 percent of a standard deviation in student ELA scores. That is, the result suggests that as a public school loses space to another school, the math test scores of its students actually increase, though the magnitude of this effect is very small.

**Table 2. Regression Results: Effect of Co-Location on Student Achievement Within Public Schools**

	Math		English Language Arts	
	Assigned to "Main" Campus	Only Schools in Single Facility	Assigned to "Main" Campus	Only Schools in Single Facility
Any Co-Location	-0.00664 [0.00993]	-0.00712 [0.00845]	-0.00557 [0.0108]	0.000499 [0.0101]
Percent of Capacity	-0.000723* [0.000384]	-0.000616* [0.000365]	-0.000346 [0.000285]	-0.000382 [0.000276]
Charter Co-Location	-0.0139 [0.0157]	-0.0174 [0.0158]	-0.00487 [0.0227]	-0.00522 [0.0216]
Number of Schools in Building	-0.00471 [0.00425]	-0.00413 [0.00384]	0.00075 [0.00431]	0.000818 [0.00393]

Note: Table reports the results of 16 individual regressions. Standard errors clustered by school reported in brackets.

\* Significant at 10% level

\*\* Significant at 5% level

The results are very similar, regardless of whether the sample uses all schools and matches students to their main campus or whether it includes only students attending schools located within a single facility. The similarity of these results suggests that this data issue is unlikely to explain the main result.

It is worth noting that in nearly all cases, the coefficient estimate is very near zero. Thus, the lack of a significant effect of colocations does not appear to be driven by imprecision of the estimate.

## DISCUSSION AND CONCLUSION

The analyses presented in this paper fail to find evidence that colocation—whether with traditional public schools or with charter schools—has any perceptible impact on student achievement in traditional public schools in New York City. Neither new colocations entering a building nor losing space within the building over time has a significant impact on student academic growth in a traditional public school.

There are, perhaps, other reasons that one would oppose charter school colocations. For instance,

such arrangements often require unwanted adjustments from the faculty and staff of the traditional public schools that are already operating in a given facility—for example, changes to the daily schedule or moving classrooms across the building. Such nuisances impose costs on the staff and teachers in traditional public schools. New York City has launched a District-Charter Collaboration Compact initiative to improve district-charter partnerships and find ways for charter colocations to be less controversial and beneficial to all students.<sup>5</sup>

What the results in this paper do make clear is that any such inconveniences for existing traditional public schools due to colocation do not have a perceptible impact on student achievement in that school. Policymakers who are considering ending the practice of colocations, then, must weigh the costs of nuisances for the receiving public school against the potential benefits provided by the charter school entering the building. Such a calculation does not appear to require consideration of any losses to actual student academic achievement in the receiving school as a result of any changes imposed by the colocation.

## ENDNOTES

<sup>1</sup> For a review of the literature on competitive effects, see B. Gill and K. Booker, "School Competition and Student Outcomes," in *Handbook of Research in Education Finance and Policy*, ed. H. F. Ladd and E. B. Fiske (New York: Routledge, 2008).

<sup>2</sup> All figures from NYC Dept. of Education and NYC Charter Schools Center

<sup>3</sup> Use of the student's test score in the prior year requires us to eliminate third-grade students because statewide standardized testing begins in the third grade.

<sup>4</sup> Results on charter school colocations are similar if charter school colocation is included as an interaction term in a model that accounts for any school colocations.

<sup>5</sup> See: [nccollaborates.org](http://nccollaborates.org)



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